

# RISK, DEATH, AND TIME: A COMMENT ON JUDGE WILLIAMS' DEFENSE OF COST-BENEFIT ANALYSIS

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## INTRODUCTION

I applaud Judge Williams for his forthright and insightful article.<sup>1</sup> Like the judge, I support the use of cost-benefit analysis (CBA) to evaluate environmental risks. But my support is more tentative than his. Judge Williams presents what might be termed a "Paretian"<sup>2</sup> defense of CBA: he argues that virtually everyone is better off, at least in an ex ante sense, when government engages in CBA. "[E]ven when we find a citizen . . . who is adversely affected (ex ante) by a specific class of risks, he seems almost certain to become a net winner from a system of risk control that in general balances cost against benefit."<sup>3</sup> The Paretian defense of CBA is problematic, in my view. The proper perspective from which to assess the welfare effect of governmental policies is the ex post perspective, not the ex ante perspective.<sup>4</sup> Clearly, it is *not* the case that everyone (or virtually everyone) is benefited ex post by government's use of CBA to evaluate environmental risks. For example, persons who will die young under regulatory regimes that are approved in virtue of CBA, and would live much longer under alternative regimes, are harmed ex post by CBA.

Nonetheless, CBA is (potentially) justifiable on non-Paretian grounds. Universal benefit is too demanding a criterion for governmental policy. A policy that harms some persons may still be normatively attractive, if it increases overall well-being: if the welfare gains to those who benefit from

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1. See Stephen F. Williams, *Squaring the Vicious Circle*, 53 ADMIN. L. REV. 257 (2001).

2. His is a "Paretian" defense because it invokes the attractive ideal of Pareto-superiority, i.e., of outcomes which benefit everyone or at least benefit some without harming anyone.

3. Williams, *supra* note 1, at 265.

4. See *infra* Part I (arguing for ex post perspective).

the policy are large enough to outweigh the welfare losses to those who are harmed. CBA, in turn, is a rough and workable proxy for the criterion of overall well-being. As Eric Posner and I have elsewhere argued, CBA should be understood as a decision procedure that enables governmental agencies to determine—in a relatively cheap, accurate, and transparent way—which policies promote overall welfare.<sup>5</sup>

Why, then, is my support for CBA more tentative than Judge Williams'? The answer, bluntly, is that *death is different*. Risk regulation is an area where at least some of the policy options that agencies must evaluate will predictably involve the premature death of certain persons, relative to alternative options. The difficulty here is not that a death-causing policy cannot maximize overall well-being; that is transparently untrue. The difficulty, rather, is that CBA breaks down when confronted with death-causing policies. At the heart of CBA is the concept of "willingness to pay"/"willingness to accept." The welfare effect of a policy on a particular person is monetized by asking how much she would be willing to pay in exchange for the policy (if it benefits her) or how much she would require as compensation for it (if the policy harms her).<sup>6</sup> Yet a person's "willingness to pay"/"willingness to accept" numbers with respect to a policy that she knows will cause her premature death may be very large, even infinite.<sup>7</sup> Economists have circumvented this difficulty through a clever reconceptualization. Death-causing policies are reconceptualized as risk-imposing policies, and CBA can now be employed, since the "willingness to pay"/"willingness to accept" methodology is quite tractable where mere risk is concerned.<sup>8</sup> But the puzzle about the justifiability of CBA remains. Why think that CBA accurately measures the effect of death-causing policies on overall well-being, where the chief harm of such policies—the harm of premature death—is not directly monetized by CBA?

There are surely some policy areas in which CBA is not an appropriate proxy for overall well-being. Tax-and-transfer policy is one such area. A

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5. See generally Matthew D. Adler & Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 YALE L.J. 165 (1999).

6. See *id.* at 177-81, 220-25; see also Matthew D. Adler & Eric A. Posner, *Implementing Cost-Benefit Analysis When Preferences are Distorted*, 29 J. LEGAL STUD. 1105, 1125-41 (2000) (proposing modifications to "willingness to pay"/"willingness to accept" methodology).

7. See Matthew Adler, *Incommensurability and Cost-Benefit Analysis*, 146 U. PA. L. REV. 1371, 1393-96 (1998).

8. See generally W. KIP VISCUSI, *FATAL TRADEOFFS: PUBLIC & PRIVATE RESPONSIBILITIES FOR RISK* 17-33 (1992) (describing "willingness to pay"/"willingness to accept" methodology); M.W. Jones-Lee, *Safety and the Saving of Life: The Economics of Safety and Physical Risk*, in *COST-BENEFIT ANALYSIS* 290 (Richard Layard & Stephen Glaister eds., 2d ed. 1994) (same).



wealth transfer from rich to poor is counted by CBA as a wash, but plausibly increases overall well-being (leaving aside incentive effects) because the marginal utility of dollars is larger for poor persons than for rich persons.<sup>9</sup> Perhaps risk regulation, too, is an area where CBA and overall well-being diverge too radically for CBA to be an appropriate decision procedure.

In my comments below, I briefly explain why CBA could be a reasonably accurate way for agencies to measure the effect of environmental policies on overall well-being, even though CBA does not directly monetize the harm of death. But unless and until the defenders of CBA provide a fuller and more robust explanation of the link between CBA and the welfare criterion, in the area of environmental risk, judges, policymakers and citizens should remain (locally) skeptical—within this domain—about the use of CBA.

#### I. JUDGE WILLIAMS' PARETIAN DEFENSE OF CBA

Judge Williams suggests that CBA benefits everyone, or virtually everyone. More precisely, I take it, his claim is that a world in which agencies employ CBA to evaluate environmental risks (call this the CBA World) is better for virtually everyone than a world in which agencies ignore cost considerations and choose those policies that minimize risk, i.e., maximize longevity, even at a huge expense to other goods (call this the Longevity-Maximizing World). I think this defense of CBA is problematic, for two reasons.

Judge Williams' claim rests upon an *ex ante* account of welfare. Even if such an account is correct, the fact that the CBA World is *ex ante* better for everyone than the Longevity-Maximizing World is not, yet, a full defense of CBA. Surely there are some procedures (procedures other than longevity-maximization) such that worlds in which agencies use these procedures are *not* *ex ante* worse for everyone than the CBA World. Here's a silly example that makes the point clear. Instead of relying upon CBA to evaluate environmental risks, agencies could choose those policies that most benefit red-haired persons (the Red-Haired World). Presumably the CBA World is worse *ex ante* for redheads than the Red-Haired World, although it is better for the brown-haired, the black-haired, and the blonde.<sup>10</sup> Judge Williams' preferred criterion, the criterion of universal *ex*

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9. See Adler & Posner, *supra* note 5, at 224, 238-39; Adler, *supra* note 7, at 1401.

10. See Matthew D. Adler, *Beyond Efficiency and Procedure: A Welfarist Theory of Regulation*, 28 FLA. ST. U. L. REV. (forthcoming 2000) (on file with author) (arguing, similarly that Paretian defense of Kaldor-Hicks procedure is incomplete, since even if that procedure lies on the Pareto frontier other procedures also do); see also Adler & Posner,

ante benefit, furnishes no obvious basis for choosing between CBA and the red-haired procedure.

Let me introduce a bit of technical lingo that economists are fond of. One outcome is "Pareto superior" to another if at least one person is better off with the first outcome and no one is worse off. In such a case, the second outcome is "Pareto inferior" to the first. Where an outcome benefits some persons, but harms others, relative to an alternative, the two outcomes are "Pareto-noncomparable." Economists are also fond of referring to the "Pareto frontier": the set of outcomes that are Pareto-inferior to no outcomes, and Pareto-noncomparable to each other. Judge Williams argues, plausibly, that the CBA World is (ex ante) Pareto-superior to the Longevity-Maximizing World. Let's assume that the claim can be strengthened, and that the CBA World lies on the (ex ante) Pareto frontier. Even so, worlds in which agencies do not use CBA to evaluate environmental risks could also lie on the (ex ante) Pareto frontier. For example, I would guess that the Red-Haired World lies on the (ex ante) Pareto frontier; any other procedure will make redheads worse off. If so, the attractive notion of universal benefit will not justify agencies in employing CBA in lieu of the red-haired procedure. The reason (if any) that agencies are justified in employing CBA, as against other procedures that produce different outcomes also lying on the Pareto frontier, is that the CBA World maximizes overall well-being—not that it is Pareto-superior. *Pace* Judge Williams, I do not believe that the admittedly attractive normative criterion of Pareto-superiority can provide a complete defense of CBA, even if welfare is understood in an ex ante rather than ex post sense.

Judge Williams might respond that (1) procedures that are targeted to benefit particular groups of people (such as the red-haired procedure), and are thereby Pareto-noncomparable to CBA, are politically infeasible, perhaps unconstitutional, and in any event just silly and that (2) all the serious and viable alternatives to CBA (such as the risk-minimization procedure) are in fact Pareto-inferior to CBA. Perhaps so. But such a response does not address my second and more substantial point of disagreement with Judge Williams—namely, my discomfort with an ex ante view of welfare. The Longevity-Maximizing World, the world in which agencies use a risk-minimization procedure to evaluate policy, is at best Pareto-inferior to the CBA World in an ex ante sense. Clearly, the Longevity-Maximizing World is not Pareto-inferior to the CBA World in an ex post sense. If agencies strive to maximize longevity, they will reject some policies that would have been approved were CBA in place; at least some of these policies will cause premature death to some persons; and at least some of these persons would have lived longer and better lives in the

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*supra* note 5, at 188-90 (rejecting Paretian defense of CBA).



Longevity-Maximizing World. (Consider, as an extreme example, an environmental policy that predictably leads to the death of one or two children, but has massive countervailing benefits not related to longevity, and therefore passes a CBA test but not a risk-minimization test. The children would be better off *ex post* were government to reject this policy, since they will die young and enjoy none of the policy's benefits if it is chosen.) In short, on an *ex post* view of welfare, the Longevity-Maximizing World and the CBA World are *Pareto-noncomparable*. Judge Williams concedes as much. He says "[i]t seems unlikely that there will be any net losers in a *system* aimed at eliminating only the risks that can be removed at a cost lower than the resulting benefits"<sup>11</sup> but then immediately qualifies this statement by noting that "it's important to think of these things *ex ante* and not *ex post* . . . [since] a person killed by a falling plane could never be described as a net beneficiary of *that flight*."<sup>12</sup> Thus, the *ex ante* perspective is an essential component of Williams' Paretian defense of CBA; and I do not believe that this perspective is defensible.

What is wrong with an *ex ante* approach? Consider a very simple case in which *ex ante* and *ex post* welfare diverge. Eric approaches a bridge spanning a lake that he needs to cross. Unbeknownst to Eric, the bridge has been fatally weakened by wear and tear, and will collapse if he steps on it.<sup>13</sup> Given Eric's information, his decision to step on to the bridge is rational. The bridge is not visibly weakened or unstable, others are currently walking on the bridge, and the probability that a given bridge will collapse at a particular time (at least in this day and age, and this part of the world) is very, very low. Further, Eric's decision not to acquire more information about the bridge may well be rational. He could hire a structural engineer to examine the bridge or a lawyer to determine whether public inspections have been performed on a timely basis, but his decision to dispense with costly information-gathering measures such as these, and to cross the bridge based on nothing more than its visual appearance plus general background facts about the rate of bridge-collapse, is seemingly quite sensible.<sup>14</sup> (After all, don't many of us frequently cross bridges even though they may be unsound, and even though we have no more data about their soundness than Eric does?) In short, Eric's ignorance about the

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11. Williams, *supra* note 1, at 264.

12. *Id.*

13. See Joel Feinberg, *Legal Paternalism*, in *RIGHTS, JUSTICE, AND THE BOUNDS OF LIBERTY: ESSAYS IN SOCIAL PHILOSOPHY* 110, 117 (1980) (characterizing a bystander's interference with someone who unknowingly crosses an unsafe bridge as a case of justified paternalism).

14. See George J. Stigler, *The Economics of Information*, 69 *J. POL. ECON.* 213 (1961) (discussing rationality of acting on limited information).

bridge's true condition is rational, and his decision to cross the bridge in light of the information he possesses is rational. That decision is *ex ante* the best decision for Eric (as compared to alternatives like rowing across the lake or circumnavigating it), and indeed is *ex ante* welfare-maximizing in a strong sense, since as I've explained Eric's second-order decision not to acquire full information about the bridge is itself rational. Nonetheless, if Eric steps on to the bridge, he will be worse off, not better off. That explains why a concerned bystander who knows about the bridge's imminent collapse, cares about Eric's welfare, and sees Eric approaching, should intervene to prevent him from crossing. Indeed, the informed bystander motivated by Eric's welfare would rationally incur significant costs to prevent Eric from crossing. For example, if the bystander had to interrupt some profitable transaction, and engage in great exertion to reach Eric in time, these costs would be justified by the very great gain to Eric's welfare—the saving of his life—that would result from the bystander's efforts. This is readily explicable if welfare is *ex post* welfare, but is very difficult to explain on the *ex ante* view of welfare.

One standard objection to the *ex post* view of welfare is that a person may decide, quite reasonably, to run certain risks—risks that may ripen into harm for the risk-taker—if the risk is low enough and the expected gain great enough.<sup>15</sup> If welfare is *ex post*, how can we explain the reasonableness of risk-taking—for example, the reasonableness of Eric's decision to step onto the bridge that, alas, turns out to be unsound? The answer is this: we need to distinguish between (1) the rationality of a person's choice, in light of his welfare; and (2) the effect of that choice on his welfare.<sup>16</sup> A rational decision-maker, concerned for his own welfare, will conceptualize each choice as a lottery of possible outcomes ( $O_1, O_2 \dots O_n$ ), will determine the *expected* benefit of each choice ( $p_1 * U(O_1) +$

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15. See, e.g., Louis Kaplow & Steven Shavell, *Principles of Fairness Versus Human Welfare*, 114 HARV. L. REV. (forthcoming 2001) (arguing for *ex ante* view of welfare on the grounds that it "overcome[s] the problem of giving excessive weight [in individual choice] to a particular subset of outcomes").

16. See MICHAEL D. RESNIK, CHOICES: AN INTRODUCTION TO DECISION THEORY 12 (1987) (distinguishing between "right decisions" and "rational decisions").

Agents' decisions are *right* if they eventuate in outcomes the agents like at least as well as any of the other possibilities that might have occurred after they had acted . . . . If we had complete foreknowledge, individual decision theory would need only one principle, namely, *make the right decision*. Unfortunately, most of our decisions must be based on what we think *might* happen or on what we think is *likely* to happen, and [in this context] . . . we still should try to make choices based on the information we do have and our best assessments of the risks involved, because that is clearly the rational approach to decision making.

*Id.*



$p_2 * U(O_2) + \dots + p_n * U(O_n)$ , where  $p_1$  is the probability of outcome  $O_1$ ,  $p_2$  is the probability of  $O_2$ , and so on, and where  $U(O_1)$  is a "utility" number representing the ex post benefit of outcome  $O_1$ ,  $U(O_2)$  is a "utility" number representing the ex post benefit of outcome  $O_2$ , and so on), and will choose that choice the expected benefit of which is greatest.<sup>17</sup> Thus a person may rationally choose an action that ends up leading to an outcome,  $O'$ , which is very bad for her—for example, if the probability  $p'$  of that outcome was quite low. All this is consistent with saying that the welfare effect of a given choice upon a person depends upon the outcome that actually results from the choice. Given our (perhaps rational) ignorance, we are vulnerable to bad luck (the bad outcomes that can result from rational choices) and can be benefited by good luck (the good outcomes that, we hope, will result from them). Why think otherwise? Why think that an uninformed or partly informed agent can be assured of realizing the expected or anticipated benefits of her choices? Because she is uninformed, the agent's expectations may not be realized; the actual (ex post) welfare effect of a choice, and the anticipated (ex ante) welfare effect, need not be the same.

Indeed, note that the agent herself, in deciding what action to choose, employs an ex post definition of welfare. The expected benefit of a risky action is calculated by determining the ex post effect of each possible outcome on the agent, discounting the outcomes by their probabilities, and aggregating. If an action has a minuscule probability  $p'$  of leading to an outcome  $O'$  in which my ex post welfare is very low, I may well be rational in choosing the action; if  $p'$  is substantially increased, it may now become rational for me to choose a different action. I am swayed by an increased probability of an outcome  $O'$  that is bad ex post for me because ex post welfare and actual welfare are the same. My actual welfare, if  $O'$  eventuates, will be my ex post welfare, and that is why an increased chance of a particular action leading to  $O'$  will tend to motivate me to choose a different action.

Now back to risk regulation. Imagine that we are holding a national plebiscite, in which citizens are asked to decide whether regulatory agencies should use CBA or, alternatively, a longevity-maximization procedure to evaluate environmental policies. Lisa is voting in the

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17. This is the standard "expected utility" account of rational decision under risk. See *id.* at 81-101; DAVID M. KREPS, A COURSE IN MICROECONOMIC THEORY 71-111 (1990). The account may need to be modified, in various ways. See RESNIK, *supra* note 16, at 101-20 (summarizing criticisms of expected utility theory, including well-known Allais and Ellsberg paradoxes); KREPS, *supra*, at 112-20 (same). The modifications would not affect my arguments in Parts I and II of this Commentary, although they could well weaken the defense of the Schelling/Mishan/Viscusi methodology presented in Part III.



plebiscite. Her expected benefit from CBA is greater than her expected benefit from the longevity maximizing procedure. So it would be rational for Lisa to vote in favor of CBA. But unbeknownst to Lisa, she will end up dying young in the CBA World, and living a long (and happy) life in the Longevity-Maximizing World. I submit that Lisa, in this *ex ante* position, is just like Eric on the verge of crossing his bridge. She rationally chooses an option that, alas, makes her much worse off. Assume that Lisa has given you a power of attorney, authorizing you to nullify her vote in the plebiscite, and to enter your own vote on her behalf, if you believe such a course of action would benefit Lisa. You somehow learn what the *ex post* effect of the policies on Lisa will be. Should you nullify her vote for CBA, and enter instead a vote for longevity-maximization? Of course you should.<sup>18</sup> CBA is not *ex post* better for Lisa; thus it is not better for her; thus you, her omniscient trustee, should nullify her uninformed choice; and thus, *pace* Judge Williams, the CBA World is not Pareto-superior to the Longevity-Maximizing World even if it is Pareto-superior in the *ex ante* sense.

The Paretian defense of CBA invokes the attractive ideal of *universal benefit*. In the case where a policy or procedure produces *ex post* losers as well as winners, that attractive ideal cannot be invoked—even if all the affected parties would rationally choose the policy or procedure *ex ante*. A different possible defense of CBA, quite distinct from the Paretian defense (although often conflated with it), is a defense that appeals to the ideal of *unanimous consent*.<sup>19</sup> Assume, with Judge Williams, that the expected or *ex ante* benefit of CBA, for each and every citizen, is greater than the expected or *ex ante* benefit of longevity-maximization. Thus, if a national plebiscite comparing CBA and longevity-maximization were held, with no intervention by omniscient trustees, each citizen would rationally vote for CBA. Is this not sufficient, quite apart from Pareto-superiority, to justify CBA? I think not. Actual consent has normative force, apart from welfare; hypothetical consent does not. If a group of persons actually agree to a course of action, the state has a *prima facie* reason to enforce the agreement upon a party who attempts to breach it, even if the costs to him of compliance are greater than the benefits to the other parties. However, the fact that persons hypothetically would have agreed to a course of action gives the state no reason, as such, to enforce this (hypothetical) agreement. It might be the case that the course of action is Pareto-superior, or welfare-

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18. Because Lisa has given you a power of attorney authorizing you to override her own choices, in light of her welfare, paternalism considerations drop out.

19. See Adler, *supra* note 10 (distinguishing between Paretian and universal-consent arguments for Kaldor-Hicks efficiency, and rejecting universal-consent argument where consent is hypothetical and partly uninformed).



maximizing, for the parties; but if so it is these ideals, not hypothetical consent, that explain why the course of action should be enforced. At a minimum, I submit that apart from welfare, hypothetical *uninformed* consent lacks normative force. Why think that the terms of hypothetical contracts which parties have not in fact signed, and which they would not sign if fully informed, possess any kind of intrinsic normative significance?

Note that the hypothetical consent of citizens voting in favor of CBA, as against longevity maximization, is partly uninformed. The *ex post* losers from CBA do not know that they will end up worse off in the CBA World, for otherwise they would vote for the longevity-maximizing procedure. I therefore am not persuaded by the hypothetical-consent argument for CBA.

## II. WELFARE-MAXIMIZATION AND CBA

Eric Posner and I have presented a defense of CBA that is grounded in overall well-being, rather than the Pareto criterion. Where a governmental project or policy produces both welfare "winners" and welfare "losers," relative to an alternative—where the two outcomes are Pareto-noncomparable—it is still (often) possible to make judgments of overall well-being.<sup>20</sup> A half-century ago, economists regularly claimed that interpersonal welfare comparisons were impossible. That view is now widely rejected, by welfare economists as well as moral philosophers. One person's welfare loss can (often) be compared with another's welfare gain, and a determination of overall welfare reached. Further, Posner and I argue, overall well-being is a morally relevant—if not morally conclusive—feature of governmental policy.<sup>21</sup> Finally, CBA is a reasonable proxy for overall well-being.<sup>22</sup> The two are not equivalent, since "willingness to pay"/"willingness to accept" amounts can be distorted by wealth and other factors<sup>23</sup>—it bears emphasis that Posner and I are less sanguine about wealth effects than Judge Williams<sup>24</sup>—but CBA or some refinement thereof is a relatively inexpensive, relatively transparent, and sufficiently accurate measure of overall well-being, in most governmental choice situations. Let us call this the "welfarist" defense of CBA, to be contrasted with Judge Williams' Paretian defense.

Is the welfarist defense of CBA applicable to environmental policy—specifically, to governmental choice situations where at least one of the options can be predicted to result in one or more premature deaths? Many

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20. See Adler & Posner, *supra* note 5, at 204-09.

21. See *id.* at 209-16.

22. See *id.* at 216-38.

23. See *id.* at 168.

24. See Williams, *supra* note 1, at 266-67.

environmental risks will predictably ripen into some deaths. This is not true of all such risks: sometimes, government needs to decide whether to regulate or to leave unregulated an activity or substance that creates a sufficiently low death risk for each exposed individual and imposes this risk on a sufficiently small population such that the risky activity or substance is likely *not* to cause any premature deaths. The welfarist defense of CBA is readily applicable to such choice situations, and I will henceforth ignore them. The more interesting question is whether regulatory agencies ought to employ CBA in evaluating *fatal environmental risks*: polluting activities or substances that, if left unregulated, will likely cut short at least one life.<sup>25</sup> Judge Williams answers this question in the affirmative. Can the welfarist?

One objection to the use of CBA in evaluating fatal environmental risks runs as follows: Longevity almost always takes priority over other constituents of human welfare. If there are two outcomes or world-states, such that certain persons die earlier in the second world-state than in the first, but no one dies earlier in the first world-state than the second, it will almost always be the case that the first outcome is best in light of overall well-being. A longevity-maximization test, or a test that seeks to minimize the number of premature deaths, therefore tracks overall well-being more closely than CBA.

This objection is unpersuasive.<sup>26</sup> To begin, the claim that longevity or the avoidance of premature death almost always takes priority over other constituents of well-being is curious. If this were true, an individual rationally maximizing her own welfare would never accept an increased risk of death, in exchange for other benefits; but we regularly observe (and approve as rational) such tradeoffs. Judge Williams makes the point very persuasively:

People take business trips by plane and car that carry some clear risk of being killed; more generally, people go to work, accepting the risks of the commute (as against those of languishing at home), in exchange for all the advantages, both in income and personal satisfaction, that come from productive work. . . . Just as we would not expect much of a person who for fear of risk never got out of bed in the morning, so we can hardly expect much of a society that stultifies itself in the name of health.<sup>27</sup>

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25. A third case is environmental substances that cause health setbacks (with attendant suffering and costs) or the risk of health setbacks, rather than death or the risk of death. The welfarist defense of CBA, in this case, is relatively straightforward—because both health setbacks, and the risk of such setbacks, can be directly priced. I, therefore, ignore the health effects of environmental pollutants, and focus instead on the evaluation of fatalities.

26. See Alastair Norcross, *Comparing Harms: Headaches and Human Lives*, 26 PHIL. & PUB. AFF. 135 (1997).

27. Williams, *supra* note 1, at 263.



Indeed, it is hard to see why longevity has *any* welfare value. Longevity, like wealth, is instrumentally valuable for human well-being—not intrinsically valuable. A longer life provides the subject more time in which to pursue those goods that are the intrinsic constituents of welfare, goods such as friendship, accomplishment, enjoyment, communal involvement, intellectual activity, or familial goods. As between a life in which some person reaches a particular level of “value” or “goodness” with respect to these goods, and a life in which she reaches the very same level but has more monetary wealth, that person’s welfare is (arguably) just the same. Wealth, *per se*, does not contribute to well-being. Similarly, as between a shorter life in which some person reaches a particular level of “value” or “goodness” with respect to the above-described goods, and a longer life in which she reaches the very same level, that person’s welfare is (arguably) just the same. Longevity, *per se*, does not contribute to well-being. Even if my claim here—that longevity lacks intrinsic welfare value—is incorrect, the contrasting claim—that longevity has overwhelming intrinsic welfare value, sufficient to outweigh the welfare value of non-longevity goods—is much too strong. Finally, note that CBA is *sensitive* to the welfare value (if any) of longevity, while the longevity-maximization criterion is insensitive to the welfare value of non-longevity goods. If persons place very great value on living longer, that will be reflected in very large “willingness to pay”/“willingness to accept” amounts for death risks; if persons place less value on longevity, their dollar valuations of death risks will be lower.

A second objection to the use of CBA in evaluating fatal environmental risks concerns the relevance of the welfare criterion in this context rather than the accuracy of CBA in tracking that criterion.<sup>28</sup> The objection runs as follows: Overall well-being ought not determine governmental policy in choice situations involving premature death. It might be welfare-maximizing for government to license certain intentional killings, or indeed to perform such killings itself; but such choices are morally impermissible, indeed horrific.

This objection does not undermine the welfarist defense of CBA, because the welfarist merely claims that overall well-being has moral *relevance*. It can be outweighed by “deontological” norms, distributive considerations, and other moral requirements, if applicable. CBA does not track the all-things-considered moral status of governmental policy; it simply tracks the status of governmental policy with respect to overall well-being, and thus must be supplemented by evaluative procedures that

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28. See Lisa Heinzerling, *The Rights of Statistical People*, 24 HARV. ENVTL. L. REV. 189 (2000).

are sensitive to deontological and distributive concerns.<sup>29</sup> Judge Williams may or may not be suggesting that CBA should be the sole governmental decision-procedure for evaluating fatal environmental risks; that view is implausible, but the defender of CBA is not committed to it.

If overall well-being were never determinative of governmental policy with respect to fatal environmental risks—if the right policy choice, in this domain, were always determined by the balance of deontological norms, distributive requirements, and other non-welfarist considerations—then the welfarist case for CBA *would* here dissipate. But it seems implausible that overall welfare loses moral relevance once death enters the picture. Deontological norms proscribe intentional killings, or perhaps direct killings,<sup>30</sup> but many of the premature deaths caused by environmental pollutants are neither intentional nor direct. Distributive considerations will not always be triggered, or at least will not be determinative. For example, if a policy causes a few middle-class persons to die a little earlier, but dramatically benefits a large group of somewhat wealthier persons, and does not implicate deontological norms, the policy ought to be enacted.<sup>31</sup> The deontological and distributive issues I touch upon here are large and complex, and merit intensive analysis. Perhaps the critic of CBA can show that non-welfarist considerations are sufficiently broad, or weighty, with respect to fatal environmental risks, that the use of CBA within this policy domain is a waste of time and effort. But no critic has yet shown that, or even attempted to do so.

What worries me more is the particular methodology that cost-benefit analysts now use in evaluating fatal environmental risks. This methodology, in brief, places a dollar value on the risk of death, not on death itself. Imagine that government must choose between two outcomes: the status quo, and an outcome in which (1) exactly one person will die; (2) one million persons are at risk of suffering this death; and (3) other benefits, valued at \$B, are realized. What is the *net* monetary cost or benefit of the second outcome, for purposes of CBA? The current methodology for answering this sort of question, first developed by Thomas Schelling and Ezra Mishan,<sup>32</sup> more recently refined and popularized by Kip Viscusi,<sup>33</sup> and now very widely used by applied

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29. See Adler & Posner, *supra* note 5, at 196, 243-45.

30. See SHELLY KAGAN, *NORMATIVE ETHICS* 70-105 (1998).

31. See Adler, *supra* note 10. See generally KAGAN, *supra* note 30, at 48-54 (discussing various plausible moral norms governing the fair distribution of well-being).

32. See T.C. Schelling, *The Life You Save May be Your Own*, in *PROBLEMS IN PUBLIC EXPENDITURE ANALYSIS* 127 (Samuel B. Chase, Jr. ed., 1968); E.J. Mishan, *Evaluation of Life and Limb: A Theoretical Approach*, 79 J. POL. ECON. 687 (1971).

33. See VISCUSI, *supra* note 8, at 17.



economists, regulatory agencies, OMB, and other cost-benefit analysts, is the following. Each person  $P_i$ , out of the million persons at risk of dying, would be willing to accept some amount  $V_i$  as compensation for his one-in-one-million risk. These (small) monetary amounts can be aggregated to produce an overall cost figure  $\$C = \sum V_i$ .<sup>34</sup> Then the net benefit of the second outcome, relative to the status quo, is  $\$B - \$C$ . The death that occurs in the second outcome is not directly valued; rather, the monetary cost of the death is set equal to the aggregate monetary cost of its concomitant risks.

There is a huge econometric literature which relies upon the Schelling/Mishan/Viscusi methodology, and employs market studies or questionnaires to infer individual "willingness to pay"/"willingness to accept" with respect to the risk of death.<sup>35</sup> From these studies, we can derive a monetary valuation for death, equaling the aggregate  $\sum V_i$ . Where the population exposed to the risk of death is large and each person's risk is low, this aggregate number seems to lie between \$2 and \$7 million. Regulatory agencies are now quite willing to place a monetary value on death, in undertaking CBA, and the numbers policymakers employ derive from the econometric literature just described.

But the Schelling/Mishan/Viscusi methodology is seriously problematic, at least on the ex post view of welfare I defended earlier. Consider again the very simple case where a policy causes exactly one premature death and places a million persons at risk of suffering this death. On an ex post view there seem to be two kinds of harm here, not one. First, each of the million suffers a risk of death; and that harm, cumulatively, is captured by  $\sum V_i$ . Second, and quite separately, the person who will die is very seriously harmed: his life is shortened, and (in the typical case) the balance of welfare goods realized over the course of his life will be much lower. But this second harm is, apparently, ignored when the total cost of the policy is set equal to  $\sum V_i$ . If  $\sum V_i$  is, in some way, a measure of this second harm, then shouldn't the total cost of the policy be set equal to  $2 \cdot \sum V_i$ ? More fundamentally, why think that  $\sum V_i$  is in any way a measure of the second harm: the harm, uniquely, suffered by the person who ends up dying prematurely? After all, the  $V_i$  might be very small. Perhaps risks below a certain de minimis level—one in ten million, say—fade away into insignificance. Individuals might be willing to accept virtually nothing as

34. This cost is meant to represent the welfare loss borne by those who die, or by those upon whom a risk of death is imposed. It is not meant to represent other costs associated with death or risk—for example, the welfare cost to friends and family when a person dies or is put at risk. See E.J. MISHAN, *COST-BENEFIT ANALYSIS: AN INFORMAL INTRODUCTION* 335-37 (4th ed. 1988).

35. See VISCUSI, *supra* note 8, at 34-74.

compensation for these de minimis risks. Where one person out of a very large population is certain to die, each person's  $V_i$  might equal zero, and then  $\Sigma V_i$  will equal zero—which can hardly be an accurate measure of the welfare loss that will befall the one person who ends up dying. In general, if we imagine one person out of a population dying, with the size of the population varying, the  $\Sigma V_i$  will presumably vary as well—and yet the (ex post) harm from the death remains the same. Why take this invariant harm to be accurately measured by the variable  $\Sigma V_i$ ?

The economist and philosopher John Broome raised these objections to the Schelling/Mishan/Viscusi methodology, in a brilliant article published more than twenty years ago.<sup>36</sup> The objection is *not* that overall well-being is indeterminate, or irrelevant, but rather that CBA fails to reflect overall well-being (or anything else of moral significance) when death enters the picture. The CBA analyst can either value death itself (which leads to very large or infinite dollar amounts), or he can value the risk of death (which yields tractable numbers, but only by shifting focus to a harm that is very different, and much less substantial, than the harm of death).

A valuation of a project may be made before it is carried out and before the distribution of its costs and benefits is exactly known, on the basis of people's choices about the risks involved. Call this an '*ex ante*' valuation. An '*ex post*' valuation, on the other hand is one made at the time of the implementation of the project, when the details of all its effects are settled. The two will often be different. My claim is that, of the two, the *ex post* valuation is the correct one (in so far as any cost-benefit analysis is correct) because it is the valuation of the actual project, whereas the other is really a valuation of the expectations created by the project. The *ex ante* valuation is useful only to the extent that it approximates the *ex post* valuation. But, in the particular case of a project causing deaths, it is no sort of approximation at all, since the former has finite [monetized] costs and the latter infinite ones.

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For an analogy, imagine trying to perform a [cost-benefit] . . . test with roses as medium instead of money. People cannot be compensated with roses for any major loss. Therefore, according to this method, rather a lot of projects would have an infinite cost. Nevertheless many of them could still be improvements (as we might be able to find out by recalculating their values in terms of money). The point is that roses are an inadequate measure for big costs and benefits. Money is a more powerful measuring instrument, but even the measuring rod of money is not long enough to encompass life and death. I hope this analogy will serve as a reminder that I have made no fancy claim that the value of life is infinite, but simply pointed out a difficulty in measuring it in monetary terms.<sup>37</sup>

Broome's objections have never been satisfactorily answered. Until they

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36. See John Broome, *Trying to Value a Life*, 9 J. PUB. ECON. 91, 95-96 (1978).

37. *Id.* at 95-96.



are answered, policymakers, judges, and citizens have good cause for skepticism about the use of CBA to evaluate governmental responses to fatal environmental risks and other sources of premature death.

### III. AN ANSWER TO BROOME?

Here is the barest sketch of an initial answer to Broome's challenge. Return once more to the case of a single death of an unidentified person (who turns out to be  $P^*$ ), out of a large population of size  $N$  exposed to the risk of this death. Assume that welfare is measurable on an interpersonally valid "utility" scale. Assume that dollars convert into utility at a constant rate  $k$ , which is the same for all persons and at all wealth levels. Assume that the project which causes  $P^*$ 's death creates benefits of  $\$B$  (so that the utility gain from the project is  $kB$ ). Assume that the utility loss to  $P^*$  from the project is  $U_{P^*}(\text{status quo}) - U_{P^*}(\text{project: } P^* \text{ dies})$ , so that the correct dollar valuation of  $P^*$ 's death—the valuation that accurately tracks its effect on overall welfare—is  $[U_{P^*}(\text{status quo}) - U_{P^*}(\text{project: } P^* \text{ dies})]/k$ . Assume, finally, that  $P^*$  and the other  $P_i$  are similarly situated in the following sense. The welfare loss each  $P_i$  would suffer, were the project to cause his death, is the same: namely,  $U_{P_i}(\text{status quo}) - U_{P_i}(\text{project: } P_i \text{ dies}) = U_{P^*}(\text{status quo}) - U_{P^*}(\text{project: } P^* \text{ dies})$ .

Given all these assumptions, the Schelling/Mishan/Viscusi methodology ends up producing a reasonably accurate dollar valuation of  $P^*$ 's death. Each  $P_i$  requires a dollar sum  $V_i$  in exchange for the  $1/N$  risk of death, where  $V_i$  is calculated as follows:  $U_{P_i}(\text{status quo}) = 1/N U_{P_i}(\text{project: } P_i \text{ dies}) + (N-1)/N U_{P_i}(\text{status quo, with a payment of } V_i \text{ to } P_i)$ .<sup>38</sup> Since dollars are converted into welfare at a constant rate  $k$ , this becomes:  $U_{P_i}(\text{status quo}) = 1/N U_{P_i}(\text{project: } P_i \text{ dies}) + (N-1)/N [U_{P_i}(\text{status quo}) + kV_i]$ .

Solving for  $V_i$ , it emerges that  $kV_i(N-1) = U_{P_i}(\text{status quo}) - U_{P_i}(\text{project: } P_i \text{ dies})$ . So  $V_i = 1/(N-1) [U_{P_i}(\text{status quo}) - U_{P_i}(\text{project: } P_i \text{ dies})]/k$ . We have assumed that each person suffers the same harm by death, i.e., that  $U_{P_i}(\text{status quo}) - U_{P_i}(\text{project: } P_i \text{ dies}) = U_{P^*}(\text{status quo}) - U_{P^*}(\text{project: } P^* \text{ dies})$ . Therefore,  $V_i = 1/(N-1) [U_{P^*}(\text{status quo}) - U_{P^*}(\text{project: } P^* \text{ dies})]/k$  for each and every  $P_i$ . Aggregating across the population,  $\sum V_i = N/(N-1) [U_{P^*}(\text{status quo}) - U_{P^*}(\text{project: } P^* \text{ dies})]/k$ , which is approximately equal to  $[U_{P^*}(\text{status quo}) - U_{P^*}(\text{project: } P^* \text{ dies})]/k$ , the correct dollar valuation of  $P^*$ 's death, if  $N$  is large. To put the point qualitatively: if all persons in a population of  $N$  suffer the same welfare loss from death, and dollars convert into welfare at the same linear rate for all persons, then the dollar equivalent (at this rate) of the welfare loss caused by the single death is

38. This calculation of  $V_i$  relies upon expected utility theory. See *supra* text accompanying note 17.

approximately  $N$  times the dollar valuation of a  $1/N$  risk of death, which is the same for all persons.

Perhaps a numerical example would make my idea a little less opaque. Assume that dollars convert into utility at a rate of one dollar to 10 "utils" (i.e.,  $k=10$ ). Assume that  $P^*$ 's total utility in the status quo is 200 million utils and his total utility in the project world (where he dies prematurely) is 180 million utils. Thus the utility loss to  $P^*$  from the project is 20 million utils, and the correct dollar valuation of his death is 20 million/10 = \$2,000,000. Assume the population exposed to the risk of death contains  $N=1000$  persons, and that—like  $P^*$ —each  $P_i$  would suffer a welfare loss of 20 million utils were he to die from the project. Then, the amount of money  $V_i$  that each  $P_i$  requires in compensation for his  $1/1000$  risk of death is calculated as follows:  $U_{P_i}(\text{status quo}) = 1/N U_{P_i}(\text{project: } P_i \text{ dies}) + (N-1)/N U_{P_i}(\text{status quo, with a payment of } V_i \text{ to } P_i)$ . Solving for  $V_i$ , it emerges that  $V_i = 1/(N-1) [U_{P_i}(\text{status quo}) - U_{P_i}(\text{project: } P_i \text{ dies})]/k$ . Thus,  $V_i = \$(1/999) * [20 \text{ million}] * (1/10) = \$2002$ . Thus,  $\Sigma V_i = \$(1000/999) * [20 \text{ million}] * (1/10) = \$2,002,000$ , which is very close to the correct dollar valuation of  $P^*$ 's death, i.e., \$2,000,000.

#### CONCLUSION

So CBA (as per the Schelling/Mishan/Viscusi methodology) is an appropriate tool for evaluating the impact of fatal environmental risks on overall well-being, given some highly stringent assumptions about the similarity of persons, the connection between dollars and welfare, and the existence of well-behaved, interpersonally valid "utility" numbers. What happens if these assumptions are relaxed? And what of the point that there are *two* types of harms in the example I have been considering, namely the widespread harm of risk and the localized harm of death? Doesn't the Schelling/Mishan/Viscusi methodology fail to account for both harms?

My tentative answer to the latter query is that risk, per se, is not a harm. Fear and other affective states associated with risk can surely constitute welfare setbacks—and should be separately measured by the cost-benefit analyst—but the mere fact that a person is at risk of death does not diminish his well-being.<sup>39</sup> Most plausibly, this is true where the person is unaware of the risk; it also may be true where he is aware of the risk, but does not fear it. As for the first query, I do not know. I am unsure whether the welfarist case for CBA depends upon the stringent (and unrealistic!) assumptions of the simple model just presented. Cost-benefit analysis

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39. See Stephen R. Perry, *Risk, Harm and Responsibility*, in *PHILOSOPHICAL FOUNDATIONS OF TORT LAW* 321, 330-39 (David G. Owen ed., 1995) (arguing that risk is not harm).



might continue to track the effect of death on overall well-being even if those assumptions are substantially relaxed; or it might not. This issue demands substantial scholarly attention. Until it is resolved, and resolved favorably for CBA, I will not be able to endorse that decisional tool as wholeheartedly as Judge Williams does.